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METRIC WEIGHTS AND MEASURES

AND

OTHER TABLES

PREPARED FOR THE USE OF

THE PHOTOGRAPHIC AND LITHOGRAPHIC OFFICES,  
SURVEY OF INDIA,

UNDER THE DIRECTION OF

COLONEL H. R. THUILLIER, R.E.,  
SURVEYOR GENERAL OF INDIA,

BY

COLONEL J. WATERHOUSE, B.S.C.,  
ASSISTANT SURVEYOR GENERAL OF INDIA,

ASSISTED BY

W. H. COLE, Esq., M.A., AND T. ARCHDALE POPE, Esq.,  
SURVEY OF INDIA.



CALCUTTA :

PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA.  
1889.







*The Photographic Society of Great Britain*  
*per Col. Waterhouse -*

07

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THE PHOTOGRAPHIC AND ALPHABETIC SURVEY OF INDIA

UNDER THE DIRECTION OF

COLONEL H. R. THURGOOD

GOVERNMENT OF INDIA

BY

COLONEL J. A. HARRISON

ASSISTANT SURVEYOR GENERAL OF INDIA

PRINTED BY

W. H. COLE, CALCUTTA, AND J. D. DIXON, LONDON

1870

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### Metric Tables.

The metric system of weights and measures having been adopted in the Photographic Office for convenience in keeping the store accounts, the following tables for the conversion of these measures to British and *vice versa* will be found useful.

They have been based on the relative equivalents of the metric and British systems given in Schedule III of the Weights and Measures Act of 1878, and have been compiled from De la Rue's Tables and other sources.

As the metric system is now ordinarily used in scientific publications, the scope of the tables has been extended so as to meet, as far as possible, the ordinary requirements of general and scientific reference.

### Use of the Tables.

The number required to be converted, whether British or metric, may either be multiplied directly by the decimal fraction representing the equivalent value of one unit of the required denomination, as found in the tables of equivalents or multipliers, according to the accuracy required; or, it may be broken up into a series of constituent parts in thousands, hundreds, tens, units and fractions, and the equivalents of the several amounts, as found from the tables of multipliers, added together. In the latter case care must be taken to change the position of the decimal point as required for multiples or fractions of the unit.



This will be best illustrated by examples.

Supposing it be desired to find the equivalent of 645·15 litres in pints.

By the first method 645·15 is multiplied by the equivalent of 1 litre in pints = 1·76077, giving a product of 1135·961.

By the second method the total number of litres may be broken up as follows :—

600·00 litres	=	1056·462 pints.
40·00 "	=	70·431 "
5·00 "	=	8·804 "
0·10 "	=	0·176 "
0·05 "	=	0·088 "
<u>645·15</u>		<u>1135·961</u>

Adding together the equivalents of the constituent parts in pints the same total is obtained.

Conversely :—Supposing it be desired to find the equivalent of 3 cwt. 25 lb 14½ ounces in kilogrammes, the whole sum may be reduced to ounces and multiplied by ·02835, the equivalent of 1 ounce in kilogrammes, thus :—

$$5790·502 \times \cdot 02835 = 164·161 \text{ kilos.}$$

But in this case the result will be more accurately and simply obtained by finding the metric equivalents of the separate items of British measure from the tables, and adding them together, thus :—

3 cwt.	=	152·407 kilos.
20 lb	=	9·072 "
5 lb	=	2·268 "
10 oz.	=	0·283 "
4 oz.	=	0·113 "
0·5 oz.	=	0·014 "
<u>TOTAL</u>		<u>164·157 "</u>

In some cases the first method will be the simplest and in others the second. The tables of multipliers show only 3 places of decimals, and therefore, if greater accuracy be required, especially in the first method, a longer fraction of at least 5 places of decimals should be taken from the tables of equivalents.

NOTE.—The value of the metre given in the Table I = 39·37079 inches, *in vacuo*, at Sea-level, was determined by Captain Kater in 1818, the temperature of the standard yard being 62° F. and of the metre 32° F. It has since then been recognised as the authoritative legal equivalent of the metre in British measure and still remains so.

In the course of his comparison of the standards of length of various countries, made at the Ordnance Survey Office, Southampton, in 1865, Captain A. R. Clarke, R.E., determined the true length of the legal equivalent of the metre under the above conditions of temperature to be 1·09362311 yards = 3·28086933 feet = 39·37043196 inches (see "Comparison of the Standards of Length," p. 280).

By this valuation the corresponding equivalents of British Measures of Length in Metric Measures are :—

1 inch	=	2·5399772 centimetres,
1 foot	=	30·4797264 "
1 yard	=	91·4391792 "
1 mile	=	1·6093296 kilometre

(as given in the Survey of India 'Auxiliary Tables').



Captain Clarke further determined the correct British equivalent of the *Scientific* metre or the length of the ideal theoretical metre, being the 10-millionth part of the quadrant of the Meridian passing through Paris, to be 39'377786 inches, or, reduced to the same standard of temperature as the legal metre, 39'376229 inches.

As stated above, in fixing the equivalent of the legal metre, the lengths of the standards were compared at their normal temperature, *viz.*, 32° for the metre and 62° F. for the standard yard. The Standards Commissioners recommended in 1871 that, for *commercial* purposes, it was desirable that the comparison of the two standards should be made at the same ordinary temperature of the air at 62° F. According to this valuation the length of a brass metre would be 39'380203 inches.

Table II is based on the determination by Prof. W. H. Miller, in 1844, of the weight of the French *Kilogramme des Archives*, in *vacuo*, to be equal to 15432'34874 imperial grains, or 2'20462125 standard platinum pounds (avoirdupois).

The Troy pound has now almost become obsolete. Under the Weights and Measures Act of 1878, avoirdupois weight is to be used exclusively for all articles sold by weight, except for bullion and precious stones, which may be sold by the Troy ounce or by decimal parts of it, and for drugs which may be sold by retail by apothecaries' weight. In the latest editions of the British Pharmacopoeia the only weights used are the grain, avoirdupois ounce (437'5 grains) and pound (7000 grains). Photographic and chemical formulæ are commonly prepared according to Apothecaries or Troy grains, drachms and ounces, but the use of Avoirdupois and Metric Weights for this purpose is fast extending.

The tables have been carefully revised in the Trigonometrical Branch office by Mr. W. H. Colle, M.A., Deputy Superintendent of Survey.



## I.—Measures

## Metric to

The fundamental unit of Metric Length and Weight is the METRE, assumed to be the 10-standard metre at its normal temperature of 32° F. is 39'37079

		Inches.	Feet.	Yards.
Millimetre	= $\frac{1}{1000}$ metre	= 0'03937	0'00325	0'00109
Centimetre	= $\frac{1}{100}$ "	= 0'39371	0'03281	0'01094
Decimetre	= $\frac{1}{10}$ "	= 3'93708	0'32800	0'10936
METRE	= unit	= 39'37079	3'28090	1'09363
Decametre	= 10 metres	= 393'70790	32'80890	10'93633
Hectometre	= 100 "	= 3,937'07900	328'08902	109'36331
Kilometre	= 1,000 "	= 39,370'79000	3,280'89917	1,093'63306
Myriametre	= 10,000 "	= 393,707'90000	32,808'99167	10,936'33056

One Micron ( $\mu$ .) (p'. micra), = one-thousandth of a millimetre = '001 millimetre = '000039 inch.

## MULTI

	Metres.	Millimetres to Inches.	Feet.		Metres.	Centimetres to Inches.	Feet.
1	0'001	0'03937	0'00328		0'01	0'3937	0'0328
2	0'002	0'07874	0'00656		0'02	0'7874	0'0656
3	0'003	0'11811	0'00984		0'03	1'1811	0'0984
4	0'004	0'15748	0'01312		0'04	1'5748	0'1312
5	0'005	0'19685	0'01640		0'05	1'9685	0'1640
6	0'006	0'23622	0'01969		0'06	2'3622	0'1969
7	0'007	0'27560	0'02297		0'07	2'7560	0'2297
8	0'008	0'31497	0'02625		0'08	3'1497	0'2625
9	0'009	0'35434	0'02953		0'09	3'5434	0'2953
10	0'010	0'39371	0'03281		0'10	3'9371	0'3281

## British to

		Millimetres.	Centimetres.
12 inches	= 1 inch	= 25'39954	2'53995
3 feet	= 1 foot	= 304'79449	30'47945
2 yards	= 1 yard	= 914'38348	91'43835
3 ½ "	= 1 fathom	= 1,828'76696	182'87670
40 "	= 1 pole or perch	= 5,029'10914	502'91091
40 poles	= 1 furlong	= 201,164'36576	20,116'43658
8 furlongs	= 1 mile	= 1,609,314'92612	160,931'49261

1 chain = 20'11644 Metres, 1 Geographical mile = 1'1527 Statute miles = 1,855'052 metres. 1 degree = 1 mil =  $\frac{1}{1000}$  inch = '0254 m.m.

## MULTI

	Millimetres.	Inches to Centimetres.	Decimetres.		Centimetres.	Feet to Decimetres.	Metres.
1	25'3995	2'54	0'254		30'479	3'048	0'305
2	50'7991	5'08	0'508		60'957	6'096	0'610
3	76'1986	7'62	0'762		91'438	9'144	0'914
4	101'5982	10'16	1'016		121'918	12'192	1'219
5	126'9977	12'70	1'270		152'397	15'240	1'524
6	152'3972	15'24	1'524		182'876	18'288	1'829
7	177'7968	17'78	1'778		213'356	21'336	2'134
8	203'1963	20'32	2'032		243'835	24'384	2'438
9	228'5959	22'86	2'286		274'315	27'432	2'743
10	253'9954	25'40	2'540		304'794	30'479	3'048

1 inch = 25,399'54 micra,  $\frac{1}{100}$  inch = 253'995 micra.

## Fractions of an Inch to Millimetres.

$\frac{1}{16}$ = 12'6998	$\frac{1}{8}$ = 5'0799	$\frac{1}{4}$ = 2'5400	$\frac{3}{16}$ = 0'8467
$\frac{1}{8}$ = 8'4665	$\frac{1}{4}$ = 4'2333	$\frac{1}{2}$ = 2'1166	$\frac{1}{2}$ = 0'7937
$\frac{1}{4}$ = 16'9330	$\frac{1}{2}$ = 3'6285	$\frac{1}{2}$ = 1'5875	$\frac{3}{4}$ = 0'6350
$\frac{1}{2}$ = 6'3499	$\frac{3}{4}$ = 3'1749	$\frac{1}{2}$ = 1'2700	$\frac{1}{2}$ = 0'5080
$\frac{1}{2}$ = 10'0497	$\frac{1}{2}$ = 2'8222	$\frac{1}{2}$ = 1'0160	$\frac{1}{2}$ = 0'2540



## of Length.

## British.

millionth part of the quarter of the earth's meridian. The legal British equivalent of the inches, of the British standard yard at the temperature of 62° F.

Furlongs.	Miles.	Miles.	Furlongs.	Yards.	Feet.	Inches.
...	...	= 0	0	0	0	about $\frac{1}{36}$
0'00005	...	= 0	0	0	0	" $3\frac{9}{10}$
0'00050	0'00005	= 0	0	1	0	" $3\frac{9}{10}$
0'00497	0'00052	= 0	0	10	2	" $9\frac{1}{10}$
0'04971	0'00521	= 0	0	109	1	" $1\frac{3}{4}$
0'49711	0'05214	= 0	0	213	1	" $10\frac{3}{4}$
4'97105	0'52138	= 0	4	156	0	" $11\frac{1}{10}$
49'71059	5'21382	= 6	1			

One micro-millimetre ( $\mu\mu$ ) = one-millionth of a millimetre or about 0'0000004 of an inch.

## PLIERS.

Inches.	Metres to Feet.	Yards.	Feet.	Kilometres to Yards.	Miles.	
39'371	3'281	1'094	3,280'899	1,093'633	0'621	1
78'742	6'562	2'187	6,561'798	2,187'266	1'243	2
118'112	9'843	3'281	9,842'697	3,280'899	1'864	3
157'483	13'124	4'375	13,123'597	4,374'532	2'486	4
196'854	16'404	5'468	16,404'496	5,468'165	3'107	5
235'225	19'685	6'562	19,685'295	6,561'798	3'728	6
275'596	22'966	7'655	22,966'294	7,655'431	4'350	7
314'966	26'247	8'749	26,247'193	8,749'064	4'971	8
354'337	29'528	9'843	29,528'092	9,842'697	5'592	9
393'708	32'809	10'936	32,808'992	10,936'331	6'214	10

## Metric.

Decimetres.	Metres.	Hectometres.	Kilometres.
0'25400	0'02540	0'00025	0'00003
3'04704	0'30479	0'00305	0'00030
9'14383	0'91438	0'00914	0'00091
18'28767	1'82877	0'01829	0'00183
50'29100	5'02911	0'05029	0'00503
20'1164366	20'116437	2'01164	0'20116
16,093'14926	1,609'31493	16'09315	1'60931

111'303 kilometres. The length of 1' of latitude at 45° = 6,076 feet = 1'1508 Statute mile = 1852 metres, nearly.  
1 line =  $\frac{1}{16}$  inch = 2'1156 mm.

## PLIERS.

Decimetres.	Yards to Metres.	Kilometres.	Metres.	Miles to Hectometres.	Kilometres.	
9'1438	0'914	0'0009	1,609'315	16'093	1'609	1
18'2877	1'829	0'0018	3,218'630	32'186	3'219	2
27'4315	2'743	0'0027	4,827'945	48'279	4'828	3
36'5753	3'658	0'0037	6,437'260	64'373	6'437	4
45'7192	4'572	0'0046	8,046'575	80'466	8'047	5
54'8630	5'486	0'0055	9,655'890	96'559	9'656	6
64'0068	6'401	0'0064	11,265'204	112'652	11'265	7
73'1507	7'315	0'0073	12,874'519	128'745	12'875	8
82'2945	8'229	0'0082	14,483'834	144'838	14'484	9
91'4383	9'144	0'0091	16,093'149	160'931	16'393	10

## Approximate Values.

1 kilometre . . . = about 5 furlongs ( '039 less)    1 mile = nearly  $1\frac{1}{8}$  kilometre (1% less).  
1 metre . . . = " 39 $\frac{1}{2}$  inches ( '029" less)    1 yard = "  $1\frac{1}{8}$  metre. 11 Metres = 12 yards.  
To convert metres to yards add  $\frac{1}{8}$ .  
1 Decimetre . . . = 4 inches (3 $\frac{1}{8}$  exactly)  
1 Centimetre . . . =  $\frac{1}{2}$  inch  
1 Millimetre . . . =  $\frac{1}{16}$  "



## II.—Measures

## Metric to British Avoir

The standard unit of Metric Weight is the KILOGRAMME, which is the weight of a

	Grammes.	Grains.	Troy Ounces, (480 grains.)	Avoirdupois Ounces, (437.5 grains.)
Milligramme	= $\frac{1}{1000}$ =	0.01543	0.0003	0.0003
Centigramme	= $\frac{1}{100}$ =	0.15432	0.0032	0.0035
Decigramme	= $\frac{1}{10}$ =	1.54323	0.0322	0.0353
GRAMME	= 1 =	15.43235	0.3215	0.3527
Decagramme	= 10 =	154.32349	3.2151	3.5274
Hectogramme	= 100 =	1,543.23487	32.1507	35.2739
Kilogramme	= 1,000 =	15,432.34874	321.5073	352.7394
Myriagramme	= 10,000 =	154,323.48740	3215.0727	3527.3940
Quintal			1968.41 Cwt.	0.09842 Tons
Millier or Tonne			19'68.12 "	0.98421 "

## MULTI

	Milligrammes to Grains.	Centigrammes to Grains.	Decigrammes to Grains.	Grammes to Grains.	Ap. Drachms.	Troy oz.	Avoir. oz.
1	0.0154	0.154	1.543	15.432	0.2572	0.032	0.035
2	0.0309	0.309	3.086	30.865	0.5144	0.064	0.071
3	0.0463	0.463	4.630	46.297	0.7716	0.096	0.106
4	0.0617	0.617	6.173	61.729	1.0288	0.129	0.141
5	0.0772	0.772	7.716	77.162	1.2860	0.161	0.176
6	0.0926	0.926	9.259	92.594	1.5432	0.193	0.212
7	0.1080	1.080	10.803	108.026	1.8004	0.225	0.247
8	0.1235	1.235	12.346	123.459	2.0576	0.257	0.282
9	0.1389	1.389	13.889	138.891	2.3149	0.289	0.318
10	0.1543	1.543	15.432	154.323	2.5721	0.322	0.353

## British Troy and

	Grains	Milligrammes.	Centigrammes.	Decigrammes.
Grain	= 20 Grains	64.79895	6.47990	0.64799
Scruple (A)	= 24 "	1,295.97901	129.59790	12.95979
Pennyweight (T)	= 60 "	1,555.17481	155.51748	15.55175
Drachm (A)	= 480 "	3,887.93702	388.79370	38.87937
Ounce	= 480 "	31,103.49617	3,110.34962	311.03496
Pound	= 5,760 "	373,241.95410	37,324.19541	3,732.41954

In the new British Pharmacopœia the Avoirdupois Ounce and

## Avoirdupois

	Grains	Milligrammes.	Centigrammes.	Decigrammes.
Dram	= 27.34 Grains	1,771.84630	177.18463	17.71846
Ounce	= 437.5 "	28,349.54078	2,834.95408	283.49541
Pound	= 7,000 "	453,592.65255	45,359.26525	4,535.92653
Stone	= 14 lb "	...	...	...
Hundredweight	= 112 "	...	...	...
Ton	= 2,240 "	...	...	...

## MULTI

	Grains to Milligrams, Centigrams, Grms.	Apothecaries' Drachms to Decigrams, Grms., Decagrams.	Troy Ounces to Grams, Hectograms, Kilograms.
1	64.799	38.879	31.103
2	129.598	77.759	62.207
3	194.397	116.638	93.310
4	259.196	155.517	124.414
5	323.995	194.397	155.517
6	388.794	233.276	186.611
7	453.593	272.156	217.724
8	518.392	311.035	248.838
9	583.190	349.914	279.931
10	647.990	388.794	311.035

Fractions of a Grain to Milligrammes.

$\frac{1}{10}$ = 32.4	$\frac{1}{100}$ = 12.06	$\frac{1}{1000}$ = 0.26	$\frac{1}{10000}$ = 45.36
$\frac{1}{100}$ = 21.6	$\frac{1}{1000}$ = 25.92	$\frac{1}{10000}$ = 8.10	$\frac{1}{100000}$ = 58.32
$\frac{1}{1000}$ = 43.2	$\frac{1}{10000}$ = 38.88	$\frac{1}{100000}$ = 7.40	$\frac{1}{1000000}$ = 3.24
$\frac{1}{10000}$ = 16.2	$\frac{1}{100000}$ = 51.84	$\frac{1}{1000000}$ = 6.48	$\frac{1}{10000000}$ = 1.20
$\frac{1}{100000}$ = 48.6	$\frac{1}{1000000}$ = 10.80	$\frac{1}{10000000}$ = 19.44	$\frac{1}{100000000}$ = 0.65



## of Weight.

## dupois and Troy.

cubic decimetre, or 61·027 cubic inches, of pure water, in vacuo, at 4° C. (39·2° F.).

Avoirdupois Pounds. (7000 grains.)	Hundredweights. (112 lbs. Av.)	Avoirdupois. lbs. oz. grs.	Troy and Apothecaries. lbs. oz. dr. grs.
...	...	= 0 0 0	0 0 0
0·00002	...	= 0 0 0	0 0 0
0·00022	...	= 0 0 0	0 0 0
0·00220	0·00002	= 0 0 0	0 0 0
0·02205	0·00020	= 0 0 0	0 0 2
0·22046	0·00197	= 0 3 230 <sup>1</sup> / <sub>2</sub>	0 3 1
2·20462	0·01968	= 2 3 119 <sup>1</sup> / <sub>2</sub>	2 8 1
22·04621	0·19684	= 22 0 323 <sup>1</sup> / <sub>2</sub>	26 9 4

= weight of 1 cubic metre of water.

## PLIERS.

Hectogrammes to Troy oz.	Avoir. lbs.	Troy oz.	Kilogrammes to Avoir. oz.	Avoir. lbs.	Quintals to Hundredweights.	Milliers to Tons.
3·215	3·527	32·151	35·274	2·205	1·968	0·984
6·430	7·055	64·301	70·548	4·409	3·937	1·968
9·645	10·582	96·452	105·822	6·614	5·905	2·953
12·860	14·110	128·603	141·096	8·818	7·874	3·937
16·075	17·637	160·754	176·370	11·023	9·842	4·921
19·290	21·164	192·904	211·644	13·228	11·810	5·905
22·506	24·692	225·055	246·918	15·432	13·779	6·889
25·721	28·219	257·206	282·192	17·637	15·747	7·874
28·936	31·747	289·357	317·465	19·842	17·716	8·858
32·151	35·274	321·507	352·739	22·046	19·684	9·842

## Apothecaries Weight to Metric.

Grammes.	Decagrammes.	Hectogrammes.	Kilogrammes.
0·06480	0·00648	0·00065	0·00006
1·29598	0·12960	0·01296	0·00130
1·55517	0·15552	0·01555	0·00156
3·88794	0·38879	0·03888	0·00389
31·10350	3·11035	0·31103	0·03110
373·24195	37·32420	3·73242	0·37324

Pound and the ordinary Grain are the only weights adopted.

## to Metric.

Grammes.	Decagrammes.	Hectogrammes.	Kilogrammes.
1·77185	0·17718	0·01772	0·00177
28·34954	2·83495	0·28350	0·02835
453·59265	45·35927	4·53593	0·45359
6,350·29714	635·02971	63·50297	6·35030
50,802·37709	5,080·23771	508·02377	50·80238
1,016,047·54179	101,604·75417	1,0160·47542	1,016·04754

## PLIERS.

Avoirdupois Ounces to Grms.	Hectogrms.	Kilogrms.	Avoirdupois Pounds to Hectogrms.	Kilogrms.	Hundredweights to Quintals.	Tons to Milliers.
28·350	0·283	0·028	453·593	4·536	0·508	1·016
56·699	0·567	0·057	907·185	9·072	1·016	2·032
85·049	0·850	0·085	1360·778	13·608	1·524	3·048
113·398	1·134	0·113	1814·571	18·144	2·032	4·064
141·748	1·417	0·142	2267·963	22·680	2·540	5·080
170·097	1·701	0·170	2721·556	27·216	3·048	6·096
198·447	1·984	0·198	3175·149	31·751	3·556	7·112
226·796	2·268	0·227	3628·741	36·287	4·064	8·128
255·146	2·551	0·255	4082·334	40·823	4·572	9·144
283·495	2·835	0·283	4535·927	45·359	5·080	10·160

## Approximate Equivalents.

1,000 Kilogrammes or Metric Tonne is nearly 1 English Ton (about 1<sup>1</sup>/<sub>2</sub>% less).

1 Kilogramme equals weight of cubic decimetre or litre of water.  
is nearly 2<sup>1</sup>/<sub>2</sub> lb. Avoirdupois (about 1% more); 5 Kilos. = 11 lb. nearly.

1 Hectogramme is about 3<sup>1</sup>/<sub>2</sub> ounces Avoirdupois.

1 Decagramme is about 1/4 ounce.

1 Gramme is about 15<sup>1</sup>/<sub>2</sub> grains.

65 Milligrammes are about 1 grain.

1 Hundredweight is nearly 51 Kilos. (about 1/2% less).

1 ounce Troy = 31<sup>1</sup>/<sub>2</sub> grammes } The ounce is commonly and conveniently taken as 30 grammes in making up

1 ounce Avoirdupois = 28<sup>1</sup>/<sub>2</sub> grammes } photographic formulæ,

1 Drachm = 4 grammes nearly (about 1<sup>1</sup>/<sub>2</sub> grains less).



### III.—Measures of

## Metric

*The Unit of Metric Measures of Capacity is the LITRE, or Cubic Decimetre, equal to the*

	Litres,	Cubic Inches,	Cubic Feet,	Fluid, Oz. <i>r</i> 73296 Cub. Ins.
Millilitre or cubic centimetre	= $\frac{1}{1000}$	0'06103	0'00004	0'03512
Centilitre = 10 cubic cent.	= $\frac{1}{100}$	0'61027	0'00035	0'35215
Decilitre 100 „ „	= $\frac{1}{10}$	6'10271	0'00353	3'52155
Litre or cubic Decimetre	= 1	61'02705	0'03532	35'21547
Decalitre	= 10	610'27052	0'35317	352'15468
Hectolitre	= 100	6,102'70515	3'53166	3,521'54683
Kilolitre (cubic metre)	= 1,000	61,027'05152	35'31658	35,215'46828
Myrialitre	= 10,000	610,270'51519	353'16581	352,154'68280

*N.B.*—The above Table is based upon the value of the Litre as given in the Weights and Measures Act of 1878 = 0·2202443 Imperial gallons. Under this valuation the Litre = 35·23909 fluid ounces

## MULTI

	Millilitres to			Centilitres to		Decilitres to	
	Minims.	Fl. Drachms.	Fl. Oz.	Fl. Drachms.	Fl. Ounces.	Fl. Ounces.	Pints.
1	16·903	0·282	0·035	2·817	0·352	3·522	0·176
2	33·807	0·563	0·070	5·634	0·704	7·043	0·352
3	50·710	0·845	0·106	8·452	1·056	10·565	0·528
4	67·614	1·127	0·141	11·269	1·409	14·086	0·704
5	84·517	1·409	0·176	14·086	1·761	17·608	0·880
6	101·421	1·690	0·211	16·903	2·113	21·129	1·056
7	118·324	1·972	0·247	19·721	2·465	24·651	1·233
8	135·227	2·254	0·282	22·538	2·817	28·172	1·409
9	152·131	2·536	0·317	25·355	3·169	31·694	1·585
10	169·034	2·817	0·352	28·172	3·522	35·215	1·761

## British

		Millilitres or cubic centimetres,	Centilitres.
Minim	=	0.05916	0.00592
Drachm	= 60 minims	3.54958	0.35496
Fluid ounce	= 8 Fl. drachms	28.39661	2.83966
Pint	= 20 Fl. ounces	567.93225	56.79322
Quart	= 40 " "	1,135.86449	113.58665
Gallon	= 160 " "	4,543.45797	454.34580

According to the corrected value of the Litre, as above, 1 pint = '56755

## MULTI

[illegible]

### Useful Data.

- 1 Minim is the measure of  $0.01146$  grains of water.
- |  |           |   |   |  |
|--|-----------|---|---|--|
| 1 Fluid drachm   | $54.6875$ | " | " |  |
| 1 Fluid ounce  | $437.5$   | " | " | = 1 ounce avoirdupois.                                     |
| 1 Pint = $1.25$ lb or                                  | $8750$    | " | " | = $34.65923$ cubic inches.                                 |
| 1 Gallon = $10$ lb or                                  | $70,000$  | " | " | = $277.27384$ " "  |
| Cubic feet $\times 6.2321$                             |           |   |   | = gallons.   |
| Gallons $\times 1.6066$                                |           |   |   | = cubic feet.  |
| Litres $\times .03532$                                 |           |   |   | = " "  |
| 1 Cubic inch of distilled water at $62^{\circ}$ F.,    |           |   |   | Litres $\times .220$ = gallons.                            |
| 1 Cubic foot of water = $6.2321$ lb = $6.2321$ gallons |           |   |   | = $160.1848$ grains = $.0361$ lb = $16.386176$ cubic cent. |
| 1 Ton of water = $35.0$ cubic feet.                    |           |   |   | = $28.315312$ litres.                                      |



## Capacity (Fluid).

to British.

weight of 1,000 grammes of pure water, at a temperature of  $4^{\circ}\text{C}$ . ( $39^{\circ}2^{\circ}\text{F}$ ).

Pints. 34'65923 Cub. Ins.	Gallons. 277'27384 Cub. Ins.	Gallons.	Pints.	Fl. Oz.	Fl. Drachms.	Minims.
= 0'00176	0'00022	= 0	0	0	0	16'9034
= 0'01761	0'00220	= 0	0	0	2	49'03
= 0'17608	0'02201	= 0	0	3	4	10'34
= 1'76077	0'22010	= 0	1	15	1	43'43
= 17'60773	2'20097	= 2	1	12	1	13'44
= 176'07734	22'00967	= 22	0	1	4	22'47
= 1,760'77341	220'09668	= 220	0	15	3	44'56
= 17,607'73414	2,200'96677	= 2,200	7	14	5	28'94

1'76077 pints or 0'22009668 gallon. More accurate determination shows that the correct equivalent is 1'761954 pints, or the Millilitre = '281913 fluid drachms = 16'91476 minims. The practical difference is trifling.

## PLIERS.

Fl. Ounces.	Litres to Pints.	Gallons.	Quarts. to Gallons.	Decalitre to Gallons.	Kilolitres to Gallons.	
35'215	1'761	0'220	8'804	2'201	220'097	1
70'431	3'522	0'440	17'608	4'402	440'193	2
105'646	5'282	0'660	26'412	6'603	660'290	3
140'862	7'043	0'880	35'215	8'804	880'387	4
176'077	8'804	1'100	44'019	11'005	1,100'483	5
211'293	10'565	1'321	52'823	13'206	1,320'580	6
246'508	12'325	1'541	61'627	15'407	1,540'677	7
281'724	14'086	1'761	70'431	17'608	1,760'773	8
316'939	15'847	1'981	79'235	19'809	1,980'870	9
352'155	17'608	2'201	88'039	22'010	2,200'967	10

to Metric.

Decilitres.	Litres.	Decalitre.	Kilolitres.
0'00059	0'00006	0'00001	...
0'03550	0'00355	0'00035	...
0'28397	0'02840	0'00284	0'000028
5'67932	0'56793	0'05679	0'000568
11'35864	1'13586	0'11359	0'001136
45'43458	4'54346	0'45435	0'004543

Litre. 1 fluid ounce = 28'377 C. C. 1 fluid drachm = 3'547 C. C. 1 minim = 0'5911 C. C.

## PLIERS.

Millilitres.	Pints to Decilitres.	Litres.	Quarts to Litres.	Gallons to Litres.	
567'932	5'679	0'568	1'136	4'543	1
1,135'864	11'359	1'136	2'272	9'087	2
1,703'797	17'038	1'704	3'408	13'630	3
2,271'729	22'717	2'272	4'543	18'174	4
2,839'661	28'397	2'840	5'679	22'717	5
3,407'593	34'076	3'408	6'815	27'261	6
3,975'526	39'755	3'976	7'951	31'804	7
4,543'458	45'435	4'543	9'087	36'348	8
5,111'390	51'114	5'111	10'223	40'891	9
5,679'322	56'793	5'679	11'359	45'435	10

## Approximate values.

- 1 Millilitre or cubic centimetre is 17 minims nearly.
- 1 Centilitre is about 2 drachms 49 minims.
- 1 Decilitre is about  $3\frac{1}{2}$  ounces.
- 1 Litre is about  $35\frac{1}{2}$  fluid ounces, or rather more than  $1\frac{1}{2}$  pint.
- 1 Kilolitre or cubic metre holds nearly one ton of water  $62^{\circ}\text{F}$ .
- 1 Fluid drachm is rather more than  $3\frac{1}{2}$  cubic centimetres ( $1\frac{1}{2}\%$  more).
- 1 Fluid ounce is about  $28\frac{1}{2}$  cubic centimetres.
- 1 Pint is about 568 cubic centimetres.
- 1 Quart is rather more than  $1\frac{1}{2}$  litres.
- 1 Gallon is about  $4\frac{1}{2}$  litres ( $1\%$  more).



## IV.--Cubic

*The unit of Metric Measurement is the STERE, or CUBIC METRE, weighing*  
Metric to

		Cubic Metre.
Cubic Millimetre	= 1,000 Cubic millim.	= 0'0000001
Cubic Centimetre	= 1,000 " centim.	= 0'0001
Millistere (cubic decim.)	= 10 " decim.	= 0'001
Centistere	= 100 " "	= 0'01
Decistere	= 1,000 " "	= 0'1
STERE (cubic metre)	= 10 " metres.	= 1
Decastere	= 100 " "	= 10
Hectostere		= 100

NOTE.—The Stere is more generally used for measuring timber, wood-work, or firewood.

MULTI

	Cubic Centimetres to Cubic Inches.	Cubic Decimetres to Cubic Inches.	Cubic Feet.
1	0'051	61'027	0'035
	0'122	122'054	0'071
3	0'183	183'081	0'106
4	0'244	244'108	0'141
5	0'305	305'135	0'177
6	0'366	366'162	0'212
7	0'427	427'189	0'247
	0'488	488'216	0'283
9	0'549	549'243	0'318
10	0'610	610'271	0'353

British to

	Cubic Inches.	Cubic Feet.	Cubic Yards.
Cubic inch	= 1	= 0'0005787	0'000002143
Cubic foot	= 1,728	= 1'00	0'03704
Cubic yard	= 46,656	= 27'00	1'00

MULTI

	Cubic Inches to Cubic Centimetres.	Cubic Decimetres.	Cubic Feet to Cubic Metres.
1	16'386	28'315	0'028
2	32'772	56'631	0'057
3	49'159	84'946	0'085
4	65'545	113'261	0'113
5	81'931	141'577	0'142
6	98'317	169'892	0'170
7	114'703	198'207	0'198
8	131'089	226'522	0'227
9	147'476	254'838	0'255
10	163'862	283'153	0'283

Approximate

- 1 cubic metre is nearly  $1\frac{1}{4}$  cubic yard ( $1\frac{1}{4}\%$  less).  
 1 " " is nearly  $35\frac{1}{2}$  cubic feet ( $05\%$  less).  
 10 cubic metres equal 13 cubic yards.  
 1 cubic yard is about  $\frac{2}{3}$  cubic metre ( $2\%$  more).  
 1 cubic foot is about  $28\frac{1}{2}$  cubic decimetres ( $018$  less).

NOTE.—To reduce cubic metres to cubic decimetres or cubic centimetres, which are all multiples of 1,000, the decimal to convert cubic metres into cubic decametres or cubic hectometres the decimal point is removed 3 places at a time to the



## Measures.

1 Millier, or 1,000 Kilogrammes, of pure water, at  $4^{\circ}$  C. ( $39^{\circ}2'$  F.).

British.

Cubic Inches.	Cubic Feet.	Cubic Yards.
0'000061	0'0000003	.....
0'061027	0'000353	0'000001
61'027052	0'035317	0'001308
610'270515	0'353166	0'013080
6102'705152	3'531658	0'130802
61027'051519	35'316581	1'308022
610270'515194	353'165807	13'080215
.....	3531'658074	130'802151

The Centistere, Decistere, Decastere, and Hectostere are not cubic measures but only measures of volume.

PLIERS.

Cubic Feet.	Cubic Metres to	Cubic Yards.	
35'317		1'308	1
70'633		2'616	2
105'950		3'924	3
141'266		5'232	4
176'583		6'540	5
211'899		7'848	6
247'216		9'156	7
282'533		10'464	8
317'849		11'772	9
353'166		13'080	10

Metric.

Cubic Centimetres.	Cubic Decimetres.	Cubic Metres.
= 16'386176	0'016386	0'000016
= 28315'311931	28'315312	0'028315
= 764513'422137	764'513422	0'764513

PLIERS.

Cubic Decimetres.	Cubic Yards to	Cubic Metres.	
764'513		0'765	1
1529'027		1'529	2
2293'540		2'294	3
3058'054		3'058	4
3822'567		3'823	5
4587'080		4'587	6
5351'594		5'352	7
6116'107		6'116	8
6880'621		6'881	9
7645'134		7'645	10

## Values.

- 1 cubic inch is about  $16\frac{3}{4}$  cubic centimetres ( $\frac{1}{16}$  less).
- 1 cubic metre is the cube of nearly  $39\frac{1}{2}$  inches ( $135\frac{1}{2}$  cubic inches less).
- 1 cubic decimetre is the cube of nearly 4 inches (3 cubic inches less).
- 1 cubic centimetre is the cube of nearly  $\frac{1}{16}$  inch ( $\frac{1}{16}$  cubic inches less).
- 1 cubic millimetre is the cube of nearly  $\frac{1}{16}$  inch ( $\frac{1}{16}$  cubic inches less).

point must be removed 3 places at a time to the right, instead of one, as the denomination would seem to imply. Similarly left.



## V.—Square

Metric to  
The Unit of Metric Measurement for Land Measure

Square Millimetre	= $\frac{1}{1000000}$ Sq. Metre.	= $\frac{1}{100}$ Sq. centim.	Sq. Inches.	Sq. Feet.
Square Centimetre	= $\frac{1}{10000}$ " "	= $\frac{1}{100}$ " decim.	= 0'00155	0'00001
Square Decimetre	= $\frac{1}{100}$ " "	=	= 0'15501	0'00108
Square Metre, or Centiare	= 1 " "	=	= 15'50059	0'10764
ARE	= 100 Sq. Metres.	=	= 1,550'05911	10'76430
Hectare	= 10,000 " "	=	= 155,005'91052	1,076'42993
		=	= ...	107,642'99341

## MULTI

	Square Millims. to	Square Centimetres to	Sq. Feet.	Sq. Inches.	Sq. Feet.	Sq. Yards.
1	Sq. Inches. 0'002	Sq. Inches. 0'155	0'001	15'501	0'108	0'012
2	0'003	0'310	0'002	31'001	0'215	0'024
3	0'005	0'465	0'003	46'502	0'323	0'036
4	0'006	0'620	0'004	62'002	0'431	0'048
5	0'008	0'775	0'005	77'503	0'538	0'060
6	0'009	0'930	0'006	93'004	0'646	0'072
7	0'011	1'085	0'008	108'504	0'753	0'084
8	0'012	1'240	0'009	124'005	0'861	0'096
9	0'014	1'395	0'010	139'505	0'969	0'108
10	0'016	1'550	0'011	155'006	1'076	0'120

## British

	Square Millimetres.	Square Centimetres.
Square Inch	= 645'13669	6'45137
" Foot	= ...	928'99583
" Yard	= ...	8,360'97150
" Perch	= ...	...
Rood	= ...	...
Acre	= ...	...
Square Mile	= ...	...

## MULTI

	Square Inches		Square Feet			Square Yards	
	to			to		to	
	Sq. Millims.	Sq. Centims.	Sq. Centims.	Sq. Decims.	Sq. Metres.	Sq. Decims.	Sq. Metres.
1	645'137	6'451	928'997	9'2900	0'093	83'610	0'8361
2	1290'273	12'903	1,857'994	18'5799	0'186	167'219	1'6722
3	1935'410	19'354	2,786'990	27'8699	0'279	250'829	2'5083
4	2580'547	25'805	3,715'987	37'1599	0'372	334'439	3'3444
5	3225'683	32'257	4,644'984	46'4498	0'464	418'049	4'1805
6	3870'820	38'708	5,573'981	55'7398	0'557	501'658	5'0166
7	4515'957	45'160	6,502'978	65'0298	0'650	585'268	5'8527
8	5161'094	51'611	7,431'975	74'3197	0'743	668'878	6'6888
9	5806'230	58'062	8,360'971	83'6097	0'836	752'487	7'5249
10	6451'367	64'514	9,289'968	92'8997	0'929	836'097	8'3610

## Approximate

One square millimetre is nearly  $\frac{1}{645}$  of a square inch, or the square of  $\frac{1}{25}$  of an inch.

One square centimetre is nearly  $\frac{1}{6.25}$  of a square inch, or the square of  $\frac{1}{2.5}$  of an inch.

One square metre contains rather more than  $10\frac{1}{2}$  square feet, or nearly  $1\frac{1}{8}$  square yards.

One are is about  $\frac{1}{4}$  of an acre.

One hectare contains nearly  $2\frac{1}{2}$  acres.



## Measure.

## British.

is the ARE = 100 square Metres or a square Decametre.

Sq. Yards.	Sq. Perches.	Roods.	Acres.
...	...	...	...
0'00012	...	...	...
0'01196	0'00040	0'00001	...
1'19603	0'03954	0'00099	0'00025
119'60333	3'95383	0'09885	0'02471
11,960'33260	395'38290	9'88457	2'47114

## PLIERS.

Sq. Metres to		Ares to			Hectares to			
Sq. Feet.	Sq. Yds.	Sq. Yds.	Perches.	Roods.	Acres.	Roods.	Acres.	
10'764	1'196	119'603	3'954	0'099	0'025	9'885	2'471	1
21'529	2'392	239'207	7'908	0'198	0'049	19'769	4'942	2
32'293	3'588	358'810	11'861	0'297	0'074	29'654	7'413	3
43'057	4'784	478'413	15'815	0'395	0'099	39'538	9'885	4
53'821	5'980	598'017	19'769	0'494	0'124	49'423	12'356	5
64'586	7'176	717'620	23'723	0'593	0'148	59'307	14'827	6
75'350	8'372	837'223	27'677	0'692	0'173	69'192	17'298	7
86'114	9'568	956'827	31'631	0'791	0'198	79'077	19'769	8
96'879	10'764	1,076'430	35'584	0'890	0'222	88'961	22'240	9
107'643	11'960	1,196'033	39'538	0'988	0'247	98'846	24'711	10

## to Metric.

Sq. Decimetres.	Sq. Metres.	Ares.	Hectares.
0'06451	0'00065	0'00001	...
9'28997	0'09290	0'00093	0'00001
83'60971	0'83610	0'00836	0'00008
2,529'19388	25'29194	0'25292	0'00253
...	1,011'67755	10'11678	0'10117
...	4,046'71021	40'46710	0'40467
...	...	25,898'94531	258'98945

## PLIERS.

Sq. Perches to		Rood to	Acres to		Square Miles to		
Sq. Metres.	Ares.	Ares.	Ares.	Hectares.	Hectares.		
25'292	0'253	10'117	40'467	0'405	258'989		1
50'584	0'506	20'234	80'934	0'809	517'979		2
75'876	0'759	30'350	121'401	1'214	776'968		3
101'168	1'012	40'467	161'868	1'619	1,035'958		4
126'460	1'265	50'584	202'336	2'023	1,294'947		5
151'752	1'518	60'701	242'803	2'428	1,553'937		6
177'044	1'770	70'817	283'270	2'833	1,812'926		7
202'336	2'023	80'934	323'737	3'237	2,071'916		8
227'627	2'276	91'051	364'204	3'642	2,330'905		9
252'919	2'529	101'168	404'671	4'047	2,589'895		10

## Values.

One square inch contains about 645 square millimetres or  $6\frac{1}{2}$  square centimetres.  
 One square foot contains nearly  $9\frac{1}{2}$  square decimetres or  $\frac{1}{11}$  of a square metre.  
 One square yard is nearly  $\frac{1}{2}$  or  $\frac{3}{4}$  of a square metre.  
 1 Acre is nearly  $40\frac{1}{2}$  ares or  $\frac{1}{4}$  of a hectare.  
 1 Square mile is very nearly 259 hectares.



## VI.—Conversion of British

## British Indian

## The unit of British Indian Weight

			Milligrammes.	Centigrammes.
Dhan	= $\frac{1}{16}$ Tola	= $\frac{1}{16}$ Grain	= 30'37451	3'03745
Rati	= $\frac{1}{8}$ " "	= $\frac{1}{8}$ Grains	= 121'49803	12'14980
Masha	= $\frac{1}{4}$ " "	= 15 " "	= 971'08426	97'19843
Tola	= 1 " "	= 180 " "	= 11663'81107	1166'38111
Chhatak	= 5 Tolas	= 900 " "	= 58319'05533	5831'90553
Ser (Seer)	= 80 " "	= 2lbs 400 Grains avoird.	= 933104'88524	93310'48852
Man (Maund)	= 3,200 " "	= 82½ lbs Avoird. 100lbs. Troy=		3732419'54095

Under Bengal Regulation VII of 1833, the only legalised British Indian weights are the *Tola*, of 180 grains Troy; the and their values vary considerably in different parts of India; those stated in the table are given by Prinsep (*Useful Tables*,

## MULTI

	Dhans to	Ratis to	Mashas to	Tolas to		
	Milligrammes.	Milligrammes.	Milligrammes.	Grammes.	Decagrammes.	Kilogrammes.
1	= 30'375	121'498	971'084	0'972	11'664	1'166
2	= 60'749	242'996	1943'969	1'944	23'328	2'333
3	= 91'124	364'494	2915'953	2'916	34'991	3'499
4	= 121'498	485'992	3887'937	3'888	46'655	4'666
5	= 151'873	607'490	4859'921	4'860	58'319	5'832
6	= 182'247	728'988	5831'906	5'832	69'983	6'998
7	= 212'622	850'486	6803'900	6'804	81'647	8'165
8	= 242'996	971'984	7775'874	7'776	93'310	9'331
9	= 273'371	1093'482	8747'858	8'748	104'974	10'497
10	= 303'745	1214'980	9719'843	9'720	116'638	11'664

## Metric to

## Mashas.

	Dhans.	Ratis.	
Milligramme	= 0'03292	0'00823	0'00103
Centigramme	= 0'32922	0'08231	0'01029
Decigramme	= 3'29223	0'82305	0'10288
Gramme	= 32'92234	8'23059	1'02882
Decagramme	= 329'22344	82'30586	10'28823
Hectogramme	= 3292'23440	823'05860	102'88232
Kilogramme	= 32922'34398	8230'58599	1028'82325
Myriagramme	= .....	.....	10288'23249
Quintal	= .....	.....	102882'32493
Millier or Tonne	= .....	.....	.....

## MULTI

	Dhans.	Ratis.	Mashas.	Tolas.	Chhataks.	Sers.
1	32'922	8'231	1'029	0'086	0'017	0'0011
2	65'845	16'461	2'058	0'171	0'034	0'0021
3	98'767	24'692	3'086	0'257	0'051	0'0032
4	131'689	32'922	4'115	0'343	0'069	0'0043
5	164'612	41'153	5'144	0'429	0'085	0'0054
6	197'534	49'384	6'173	0'514	0'103	0'0064
7	230'456	57'614	7'202	0'600	0'120	0'0075
8	263'379	65'845	8'231	0'686	0'137	0'0086
9	296'301	74'075	9'259	0'772	0'154	0'0096
10	329'223	82'305	10'288	0'857	0'171	0'0107

## Approximate Equivalents.

- 1 Rati is nearly  $1\frac{1}{2}$  decigrammes (about '035 less).
- 1 Masha is nearly 1 gramme (about '028 less).
- 1 Tola is nearly  $1\frac{1}{2}$  grammes (about '003 less).
- 1 Ser is nearly 1 kilogramme (about '007 less).
- 1 Man is nearly  $3\frac{1}{2}$  myriagrammes (about '019 less).
- " "  $37\frac{1}{2}$  kilogrammes (about '009 less).
- 1 Decigramme is nearly  $\frac{1}{16}$  of a tola, or  $3\frac{1}{2}$  dhans (about '04 less).
- 1 Gramme is nearly 1 masha or  $\frac{1}{16}$  of a tola (about '019 more).
- 1 Decagramme is about  $\frac{1}{16}$  of a tola (about '007 more).
- 1 Hectogramme is about  $8\frac{1}{2}$  tolas (about '074 more) or nearly  $1\frac{1}{2}$  chhataks (about '035 less).
- 1 Kilogramme is nearly  $85\frac{1}{2}$  tolas (about '015 less) or about 1 ser (about '072 more).
- 1 Quintal is about  $2\frac{1}{2}$  mans (about '0125 more).
- 1 Millier or Tonne is nearly  $26\frac{1}{2}$  mans (about '008 less).



# Indian and Metric Weights.

to Metric.

is the TOLA, equal to 180 Grains.

Decigrammes.	Grammes.	Decagrammes.	Hectogrammes.	Kilogrammes.	Myriagrammes.
0'30375	0'03037	0'00304	0'00030	0'00003	.....
1'21498	0'12150	0'01215	0'00121	0'00012	0'00001
9'71984	0'97198	0'09720	0'00972	0'00097	0'00010
116'63811	11'66381	1'16638	0'11664	0'01166	0'00117
583'10055	58'21906	5'83101	0'58319	0'05832	0'00583
933'04885	93'31048	9'33104	0'93310	0'09310	0'09331
37324'95410	3732'49541	373'24954	37'32495	3'73242	3'73242

Ser equal to 80 Tolas and the Man equal to 40 Sers. Mashas, Ratis and Dhans are used by native goldsmiths and jewellers, p. 96). There is also a weight called Panseri equal to 5 sers.

## PLIERS.

Ohhataks to		Sers to		Mans to	
Grammes.	Kilogrammes.	Grammes.	Kilogrammes.	Kilogrammes.	
58'319	0'058	933'105	0'933	37'324	1
116'638	0'117	1856'210	1'866	74'648	2
174'957	0'175	2799'315	2'799	111'973	3
233'276	0'233	3732'420	3'732	149'297	4
291'595	0'292	4665'524	4'665	186'621	5
349'914	0'350	5598'629	5'599	223'945	6
408'233	0'408	6531'734	6'532	261'269	7
466'552	0'467	7464'839	7'465	298'594	8
524'871	0'525	8397'944	8'398	335'918	9
583'191	0'583	9331'049	9'331	373'242	10

## British Indian.

Tolas.	Ohhataks.	Sers.	Mans.
0'00009	0'00002	.....	.....
0'00086	0'00017	0'00001	.....
0'00857	0'00171	0'00011	.....
0'08574	0'01715	0'00107	0'00003
0'85735	0'17147	0'01072	0'00017
8'57353	1'71471	0'10717	0'00268
85'73527	17'14705	1'07169	0'02679
857'35271	171'47054	10'71691	0'26792
8573'52708	1714'70542	107'16909	2'67923
85735'27078	17147'05416	1071'69083	26'79227

## PLIERS.

Kilogrammes to		Quintals to	
Tolas.	Ohhataks.	Sers.	Mans.
85'735	17'147	1'0717	0'0268
171'471	34'294	2'1434	0'0536
237'206	51'441	3'2151	0'0804
342'941	68'588	4'2868	0'1072
428'676	85'735	5'3585	0'1340
514'412	102'882	6'4301	0'1608
600'147	120'029	7'5018	0'1875
685'882	137'176	8'5735	0'2143
771'617	154'323	9'6452	0'2411
857'353	171'471	10'7169	0'2679
			26'7923

## Fractions of a Tola to Milligrammes.

$\frac{1}{10}$  = 728'988  
 $\frac{1}{100}$  = 1457'976  
 $\frac{1}{1000}$  = 2915'953  
 $\frac{1}{10000}$  = 3887'937

$\frac{1}{10}$  = 4373'929  
 $\frac{1}{100}$  = 5831'906  
 $\frac{1}{1000}$  = 7775'874  
 $\frac{1}{10000}$  = 8747'858

## Useful Data.

- 1 Man is equal to 100 lb Troy.
- 35 Sers are equal to 72 lb Avoirdupois.
- 1 Pound Troy is equal to 32 Tolas.
- 1 Ounce Troy is equal to 2'67 Tolas.
- $\frac{1}{2}$  Ounce Avoirdupois (the unit for English letter postage) = 1'215 Tolas.
- 15 Grammes (the unit for foreign letter postage) = 1'286 Tolas or about  $\frac{1}{4}$  Tolas.



## VII.—Table of Sizes of Lithographic and Drawing

DESCRIPTION.	Broadside.	Long folio.	Long thirds.	Long fourths.	Broad folio.	Broad thirds.
LITHOGRAPHIC						
Special . . . . .	$59 \times 38\frac{1}{2}$	$59 \times 19\frac{1}{2}$	$59 \times 12\frac{3}{4}$	$59 \times 9\frac{1}{5}$	$38\frac{1}{2} \times 29\frac{1}{2}$	$38\frac{1}{2} \times 19\frac{3}{8}$
Antiquarian . . . . .	$53\frac{1}{2} \times 31\frac{1}{2}$	$53\frac{1}{2} \times 15\frac{5}{8}$	$53\frac{1}{2} \times 10\frac{5}{12}$	$53\frac{1}{2} \times 7\frac{1}{8}$	$31\frac{1}{2} \times 26\frac{3}{4}$	$31\frac{1}{2} \times 17\frac{5}{8}$
Double Imperial . . . . .	$44\frac{1}{2} \times 30\frac{1}{2}$	$44\frac{1}{2} \times 15\frac{1}{8}$	$44\frac{1}{2} \times 10\frac{1}{2}$	$44\frac{1}{2} \times 7\frac{1}{16}$	$30\frac{1}{2} \times 22\frac{1}{8}$	$30\frac{1}{2} \times 14\frac{3}{8}$
Thick Special . . . . .	$40 \times 40$	$40 \times 20$	$40 \times 13\frac{1}{8}$	$40 \times 10$	$40 \times 20$	$40 \times 13\frac{1}{8}$
Double Elephant . . . . .	$40 \times 27$	$40 \times 13\frac{1}{2}$	$40 \times 9$	$40 \times 6\frac{3}{4}$	$27 \times 20$	$27 \times 13\frac{1}{8}$
Double Royal . . . . .	$40 \times 25$	$40 \times 12\frac{1}{2}$	$40 \times 8\frac{3}{8}$	$40 \times 6\frac{1}{4}$	$25 \times 20$	$25 \times 13\frac{1}{8}$
Atlas . . . . .	$34 \times 26\frac{1}{2}$	$34 \times 13\frac{1}{4}$	$34 \times 8\frac{5}{8}$	$34 \times 6\frac{5}{8}$	$26\frac{1}{2} \times 17$	$26\frac{1}{2} \times 11\frac{1}{8}$
Imperial . . . . .	$30 \times 22$	$30 \times 11$	$30 \times 7\frac{1}{8}$	$30 \times 5\frac{1}{2}$	$22 \times 15$	$22 \times 10$
Super Royal . . . . .	$27 \times 19\frac{1}{2}$	$27 \times 9\frac{3}{2}$	$27 \times 6\frac{1}{2}$	$27 \times 4\frac{7}{8}$	$19\frac{1}{2} \times 13\frac{1}{2}$	$19\frac{1}{2} \times 9$

## WHATMAN'S HAND-MADE

Antiquarian . . . . .	$53\frac{1}{2} \times 30\frac{1}{2}$	$53\frac{1}{2} \times 15\frac{1}{4}$	$53\frac{1}{2} \times 10\frac{1}{8}$	$53\frac{1}{2} \times 7\frac{5}{8}$	$30\frac{1}{2} \times 26\frac{5}{8}$	$30\frac{1}{2} \times 17\frac{3}{4}$
Double Elephant . . . . .	$40\frac{1}{2} \times 27$	$40\frac{1}{2} \times 13\frac{1}{2}$	$40\frac{1}{2} \times 9$	$40\frac{1}{2} \times 6\frac{3}{4}$	$27 \times 20\frac{1}{4}$	$27 \times 13\frac{1}{8}$
Atlas . . . . .	$33\frac{1}{2} \times 26$	$33\frac{1}{2} \times 13$	$33\frac{1}{2} \times 8\frac{3}{8}$	$33\frac{1}{2} \times 6\frac{1}{2}$	$26 \times 16\frac{3}{4}$	$26 \times 11\frac{1}{8}$
Imperial . . . . .	$30\frac{1}{2} \times 22$	$30\frac{1}{2} \times 11$	$30\frac{1}{2} \times 7\frac{1}{8}$	$30\frac{1}{2} \times 5\frac{1}{2}$	$22 \times 15\frac{1}{4}$	$22 \times 10\frac{1}{8}$
Super Royal . . . . .	$27 \times 19\frac{1}{2}$	$27 \times 9\frac{3}{2}$	$27 \times 6\frac{1}{2}$	$27 \times 4\frac{7}{8}$	$19\frac{1}{2} \times 13\frac{1}{2}$	$19\frac{1}{2} \times 9$
Royal . . . . .	$24 \times 19\frac{1}{2}$	$24 \times 9\frac{3}{4}$	$24 \times 6\frac{1}{2}$	$24 \times 4\frac{7}{8}$	$19\frac{1}{2} \times 12$	$19\frac{1}{2} \times 8$
Medium . . . . .	$22 \times 17\frac{1}{2}$	$22 \times 8\frac{3}{4}$	$22 \times 5\frac{5}{8}$	$22 \times 4\frac{3}{8}$	$17\frac{1}{2} \times 11$	$17\frac{1}{2} \times 7\frac{1}{8}$
Demy . . . . .	$20 \times 15\frac{1}{2}$	$20 \times 7\frac{3}{4}$	$20 \times 5\frac{1}{8}$	$20 \times 3\frac{7}{8}$	$15\frac{1}{2} \times 10$	$15\frac{1}{2} \times 6\frac{3}{8}$



## Papers and their Principal Subdivisions.

Long quarto.	Broad quarto.	Long octavo.	Common octavo.	Long 12mo.	Common 12mo.	16mo.	32mo.
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## PAPERS.

$38\frac{1}{4} \times 14\frac{3}{4}$	$29\frac{1}{2} \times 19\frac{1}{2}$	$29\frac{1}{2} \times 9\frac{9}{16}$	$19\frac{1}{8} \times 14\frac{3}{4}$	$19\frac{1}{8} \times 9\frac{5}{8}$	$19\frac{3}{8} \times 9\frac{9}{16}$	$14\frac{3}{4} \times 9\frac{9}{16}$	$9\frac{9}{16} \times 7\frac{3}{8}$
$31\frac{1}{4} \times 13\frac{3}{8}$	$26\frac{3}{4} \times 15\frac{5}{8}$	$26\frac{3}{4} \times 7\frac{13}{16}$	$15\frac{5}{8} \times 13\frac{3}{8}$	$15\frac{5}{8} \times 8\frac{11}{12}$	$17\frac{5}{8} \times 7\frac{13}{16}$	$13\frac{3}{8} \times 7\frac{13}{16}$	$7\frac{13}{16} \times 6\frac{11}{16}$
$30\frac{1}{4} \times 11\frac{1}{16}$	$22\frac{1}{2} \times 15\frac{1}{8}$	$22\frac{1}{8} \times 7\frac{9}{16}$	$15\frac{5}{8} \times 11\frac{1}{16}$	$15\frac{1}{8} \times 7\frac{3}{8}$	$14\frac{3}{4} \times 7\frac{9}{16}$	$11\frac{1}{16} \times 7\frac{9}{16}$	$7\frac{9}{16} \times 5\frac{7}{16}$
$40 \times 10$	$20 \times 20$	$20 \times 10$	$20 \times 10$	$20 \times 6\frac{2}{3}$	$13\frac{1}{2} \times 10$	$10 \times 10$	$10 \times 5$
$27 \times 10$	$20 \times 13\frac{1}{2}$	$20 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 10$	$13\frac{1}{2} \times 6\frac{2}{3}$	$13\frac{1}{8} \times 6\frac{3}{4}$	$10 \times 6\frac{3}{4}$	$6\frac{2}{3} \times 5$
$25 \times 10$	$20 \times 12\frac{1}{2}$	$20 \times 6\frac{1}{4}$	$12\frac{1}{2} \times 10$	$12\frac{1}{2} \times 6\frac{2}{3}$	$13\frac{1}{8} \times 6\frac{1}{4}$	$10 \times 6\frac{1}{4}$	$6\frac{1}{4} \times 5$
$26\frac{1}{2} \times 8\frac{1}{2}$	$17 \times 13\frac{1}{4}$	$17 \times 6\frac{5}{8}$	$13\frac{1}{4} \times 8\frac{1}{2}$	$13\frac{1}{4} \times 5\frac{3}{8}$	$11\frac{1}{3} \times 6\frac{5}{8}$	$8\frac{1}{2} \times 6\frac{5}{8}$	$6\frac{5}{8} \times 4\frac{1}{4}$
$22 \times 7\frac{1}{2}$	$15 \times 11$	$15 \times 5\frac{1}{2}$	$11 \times 7\frac{1}{2}$	$11 \times 5$	$10 \times 5\frac{1}{2}$	$7\frac{1}{2} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{3}{4}$
$19\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 9\frac{3}{4}$	$13\frac{1}{2} \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6\frac{3}{4}$	$9\frac{3}{4} \times 4\frac{1}{2}$	$9 \times 4\frac{7}{8}$	$6\frac{3}{4} \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3\frac{3}{8}$

## DRAWING PAPERS.

$30\frac{1}{2} \times 13\frac{5}{16}$	$26\frac{5}{8} \times 15\frac{1}{4}$	$26\frac{5}{8} \times 7\frac{5}{8}$	$15\frac{1}{4} \times 13\frac{5}{16}$	$15\frac{1}{4} \times 8\frac{7}{8}$	$17\frac{3}{4} \times 7\frac{5}{8}$	$13\frac{5}{16} \times 7\frac{5}{8}$	$7\frac{5}{8} \times 6\frac{1}{8}$
$27 \times 10\frac{1}{8}$	$20\frac{1}{4} \times 13\frac{1}{2}$	$20\frac{1}{4} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 10\frac{1}{8}$	$13\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 6\frac{3}{4}$	$10\frac{1}{8} \times 6\frac{3}{4}$	$6\frac{3}{4} \times 5\frac{1}{16}$
$26 \times 8\frac{3}{8}$	$16\frac{3}{4} \times 13$	$16\frac{3}{4} \times 6\frac{1}{2}$	$13 \times 8\frac{3}{8}$	$13 \times 5\frac{7}{12}$	$11\frac{1}{8} \times 6\frac{1}{2}$	$8\frac{3}{8} \times 6\frac{1}{2}$	$6\frac{1}{2} \times 4\frac{7}{16}$
$22 \times 7\frac{5}{8}$	$15\frac{1}{4} \times 11$	$15\frac{1}{4} \times 5\frac{1}{2}$	$11 \times 7\frac{5}{8}$	$11 \times 5\frac{1}{12}$	$10\frac{1}{8} \times 5\frac{1}{2}$	$7\frac{5}{8} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{1}{16}$
$19\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 9\frac{3}{4}$	$13\frac{1}{2} \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6\frac{3}{4}$	$9\frac{3}{4} \times 4\frac{1}{2}$	$9 \times 4\frac{7}{8}$	$6\frac{3}{4} \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3\frac{3}{8}$
$19\frac{1}{2} \times 6$	$12 \times 9\frac{3}{4}$	$12 \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6$	$9\frac{3}{4} \times 4$	$8 \times 4\frac{7}{8}$	$6 \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3$
$17\frac{1}{2} \times 5\frac{1}{2}$	$11 \times 8\frac{3}{4}$	$11 \times 4\frac{3}{8}$	$8\frac{3}{4} \times 5\frac{1}{2}$	$8\frac{3}{4} \times 3\frac{3}{8}$	$7\frac{1}{2} \times 4\frac{3}{8}$	$5\frac{1}{2} \times 4\frac{3}{8}$	$4\frac{3}{8} \times 2\frac{3}{4}$
$15\frac{1}{2} \times 5$	$10 \times 7\frac{3}{4}$	$10 \times 3\frac{7}{8}$	$7\frac{3}{4} \times 5$	$7\frac{3}{4} \times 3\frac{1}{2}$	$6\frac{3}{4} \times 3\frac{7}{8}$	$5 \times 3\frac{7}{8}$	$3\frac{7}{8} \times 1\frac{1}{2}$



## VII.—Table of Sizes of Printing and Writing

DESCRIPTION.	Broad side.	Long folio.	Long thirds.	Long fourths.	Broad folio.	Broad thirds.
PRINTING						
Double Super Royal . . .	$41 \times 27\frac{1}{2}$	$41 \times 13\frac{3}{4}$	$41 \times 9\frac{1}{8}$	$41 \times 6\frac{1}{8}$	$27\frac{1}{2} \times 20\frac{1}{2}$	$27\frac{1}{2} \times 13\frac{3}{4}$
Do. Royal . . .	$40 \times 25$	$40 \times 12\frac{1}{2}$	$40 \times 8\frac{1}{2}$	$40 \times 6\frac{1}{4}$	$25 \times 20$	$25 \times 13\frac{1}{2}$
Do. Demy . . .	$35 \times 22\frac{1}{2}$	$35 \times 11\frac{1}{2}$	$35 \times 7\frac{1}{2}$	$35 \times 5\frac{5}{8}$	$22\frac{1}{2} \times 17\frac{1}{2}$	$22\frac{1}{2} \times 11\frac{3}{4}$
Imperial . . .	$30 \times 22$	$30 \times 11$	$30 \times 7\frac{1}{2}$	$30 \times 5\frac{1}{2}$	$22 \times 15$	$22 \times 10$
Double Crown . . .	$30 \times 20$	$30 \times 10$	$30 \times 6\frac{3}{4}$	$30 \times 5$	$20 \times 15$	$20 \times 10$
Super Royal . . .	$28\frac{1}{2} \times 21\frac{1}{2}$	$28\frac{1}{2} \times 10\frac{3}{4}$	$28\frac{1}{2} \times 7\frac{1}{8}$	$28\frac{1}{2} \times 5\frac{3}{8}$	$21\frac{1}{2} \times 14\frac{1}{4}$	$21\frac{1}{2} \times 9\frac{1}{2}$
Double Foolscap . . .	$27 \times 17$	$27 \times 8\frac{1}{2}$	$27 \times 5\frac{3}{4}$	$27 \times 4\frac{1}{4}$	$17 \times 13\frac{1}{2}$	$17 \times 9$
Royal . . .	$25 \times 20$	$25 \times 10$	$25 \times 6\frac{3}{4}$	$25 \times 5$	$20 \times 12\frac{1}{2}$	$20 \times 8\frac{1}{2}$
Medium . . .	$24 \times 19$	$24 \times 9\frac{1}{2}$	$24 \times 6\frac{1}{2}$	$24 \times 4\frac{3}{4}$	$19 \times 12$	$19 \times 8$
Demy . . .	$22\frac{1}{4} \times 18$	$22\frac{1}{4} \times 9$	$22\frac{1}{4} \times 6$	$22\frac{1}{4} \times 4\frac{1}{2}$	$18 \times 11\frac{1}{8}$	$18 \times 7\frac{5}{12}$
Crown . . .	$20 \times 15$	$20 \times 7\frac{1}{2}$	$20 \times 5$	$20 \times 3\frac{3}{4}$	$15 \times 10$	$15 \times 6\frac{3}{4}$
Foolscap . . .	$17 \times 13\frac{1}{2}$	$17 \times 6\frac{3}{4}$	$17 \times 4\frac{1}{2}$	$17 \times 3\frac{3}{8}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 5\frac{3}{4}$

## WRITING

Imperial . . .	$30 \times 22$	$30 \times 11$	$30 \times 7\frac{1}{2}$	$30 \times 5\frac{1}{2}$	$22 \times 15$	$22 \times 10$
Super Royal H. M. B. L. . .	$27 \times 19\frac{1}{2}$	$27 \times 9\frac{5}{8}$	$27 \times 6\frac{5}{16}$	$27 \times 4\frac{1}{16}$	$19\frac{1}{2} \times 13\frac{1}{2}$	$19\frac{1}{2} \times 9$
Royal H. M. B. L. . .	$24\frac{1}{4} \times 19\frac{1}{2}$	$24\frac{1}{4} \times 9\frac{3}{4}$	$24\frac{1}{4} \times 6\frac{1}{2}$	$24\frac{1}{4} \times 4\frac{7}{8}$	$19\frac{1}{2} \times 12\frac{1}{2}$	$19\frac{1}{2} \times 8\frac{1}{16}$
Do. H. M. . .	$24 \times 19\frac{1}{2}$	$24 \times 9\frac{3}{8}$	$24 \times 6\frac{1}{2}$	$24 \times 4\frac{1}{8}$	$19\frac{1}{2} \times 12$	$19\frac{1}{2} \times 8$
Medium H. M. B. L. . .	$22 \times 17\frac{1}{4}$	$22 \times 8\frac{5}{8}$	$22 \times 5\frac{3}{8}$	$22 \times 4\frac{5}{16}$	$17\frac{1}{4} \times 11$	$17\frac{1}{4} \times 7\frac{1}{2}$
Do. M. M. B. L. . .	$22\frac{1}{2} \times 17\frac{3}{4}$	$22\frac{1}{2} \times 8\frac{7}{8}$	$22\frac{1}{2} \times 5\frac{1}{2}$	$22\frac{1}{2} \times 4\frac{7}{16}$	$17\frac{3}{4} \times 11\frac{1}{4}$	$17\frac{3}{4} \times 7\frac{1}{2}$
Demy H. M. B. L. . .	$20 \times 15\frac{3}{4}$	$20 \times 7\frac{7}{8}$	$20 \times 5\frac{1}{4}$	$20 \times 3\frac{15}{16}$	$15\frac{3}{4} \times 10$	$15\frac{3}{4} \times 6\frac{3}{8}$
Do. M. M. B. L. . .	$20\frac{1}{4} \times 15\frac{1}{2}$	$20\frac{1}{4} \times 7\frac{5}{8}$	$20\frac{1}{4} \times 5\frac{1}{8}$	$20\frac{1}{4} \times 3\frac{13}{16}$	$15\frac{1}{2} \times 10\frac{1}{2}$	$15\frac{1}{2} \times 6\frac{1}{4}$
Double Foolscap M. M. . .	$27 \times 17$	$27 \times 8\frac{1}{2}$	$27 \times 5\frac{3}{8}$	$27 \times 4\frac{1}{4}$	$17 \times 13\frac{1}{2}$	$17 \times 9$
Foolscap H. M. B. L. . .	$17 \times 13\frac{1}{2}$	$17 \times 6\frac{3}{4}$	$17 \times 4\frac{1}{2}$	$17 \times 3\frac{3}{8}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 5\frac{3}{4}$
Do. M. M. . .	$16\frac{1}{2} \times 13\frac{1}{4}$	$16\frac{1}{2} \times 6\frac{5}{8}$	$16\frac{1}{2} \times 4\frac{5}{16}$	$16\frac{1}{2} \times 3\frac{5}{16}$	$13\frac{1}{4} \times 8\frac{1}{4}$	$13\frac{1}{4} \times 5\frac{1}{2}$



Papers and their Principal Subdivisions—*continued.*

Long quarto.	Broad quarto.	Long octavo.	Common octavo.	Long 12mo.	Common 12mo.	16mo.	32mo.
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## PAPERS.

$27\frac{1}{2} \times 10\frac{1}{4}$	$20\frac{1}{2} \times 13\frac{3}{4}$	$20\frac{1}{2} \times 6\frac{1}{8}$	$13\frac{3}{4} \times 10\frac{1}{4}$	$13\frac{3}{4} \times 6\frac{5}{8}$	$13\frac{3}{4} \times 6\frac{1}{8}$	$10\frac{1}{4} \times 6\frac{1}{8}$	$6\frac{1}{8} \times 5\frac{1}{8}$
$25 \times 10$	$20 \times 12\frac{1}{2}$	$20 \times 6\frac{1}{4}$	$12\frac{1}{2} \times 10$	$12\frac{1}{2} \times 6\frac{3}{8}$	$13\frac{1}{8} \times 6\frac{1}{4}$	$10 \times 6\frac{1}{4}$	$6\frac{1}{4} \times 5$
$22\frac{1}{2} \times 8\frac{3}{4}$	$17\frac{1}{2} \times 11\frac{1}{4}$	$17\frac{1}{2} \times 5\frac{5}{8}$	$11\frac{1}{4} \times 8\frac{3}{4}$	$11\frac{1}{4} \times 5\frac{5}{8}$	$11\frac{2}{3} \times 5\frac{5}{8}$	$8\frac{3}{4} \times 5\frac{5}{8}$	$5\frac{5}{8} \times 4\frac{3}{8}$
$22 \times 7\frac{1}{2}$	$15 \times 11$	$15 \times 5\frac{1}{2}$	$11 \times 7\frac{1}{2}$	$11 \times 5$	$10 \times 5\frac{1}{2}$	$7\frac{1}{2} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{3}{4}$
$20 \times 7\frac{1}{2}$	$15 \times 10$	$15 \times 5$	$10 \times 7\frac{1}{2}$	$10 \times 5$	$10 \times 5$	$7\frac{1}{2} \times 5$	$5 \times 3\frac{3}{4}$
$21\frac{1}{2} \times 7\frac{1}{8}$	$14\frac{1}{4} \times 10\frac{3}{4}$	$14\frac{1}{4} \times 5\frac{3}{8}$	$10\frac{3}{4} \times 7\frac{1}{8}$	$10\frac{3}{4} \times 4\frac{3}{4}$	$9\frac{1}{2} \times 5\frac{3}{8}$	$7\frac{1}{8} \times 5\frac{3}{8}$	$5\frac{3}{8} \times 3\frac{9}{16}$
$17 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 4\frac{1}{4}$	$8\frac{1}{2} \times 6\frac{3}{4}$	$8\frac{1}{2} \times 4\frac{1}{2}$	$9 \times 4\frac{1}{4}$	$6\frac{3}{4} \times 4\frac{1}{4}$	$4\frac{1}{4} \times 3\frac{3}{8}$
$20 \times 6\frac{1}{4}$	$12\frac{1}{2} \times 10$	$12\frac{1}{2} \times 5$	$10 \times 6\frac{1}{4}$	$10 \times 4\frac{1}{8}$	$8\frac{1}{8} \times 5$	$6\frac{1}{4} \times 5$	$5 \times 3\frac{1}{8}$
$19 \times 6$	$12 \times 9\frac{1}{2}$	$12 \times 4\frac{3}{4}$	$9\frac{1}{2} \times 6$	$9\frac{1}{2} \times 4$	$8 \times 4\frac{3}{4}$	$6 \times 4\frac{3}{4}$	$4\frac{3}{4} \times 3$
$18 \times 5\frac{9}{10}$	$11\frac{1}{5} \times 9$	$11\frac{1}{5} \times 4\frac{1}{2}$	$9 \times 5\frac{9}{10}$	$9 \times 3\frac{1}{2}$	$7\frac{5}{12} \times 4\frac{1}{2}$	$5\frac{9}{10} \times 4\frac{1}{2}$	$4\frac{1}{2} \times 2\frac{3}{5}$
$15 \times 5$	$10 \times 7\frac{1}{2}$	$10 \times 3\frac{3}{4}$	$7\frac{1}{2} \times 5$	$7\frac{1}{2} \times 3\frac{1}{2}$	$6\frac{2}{3} \times 3\frac{3}{4}$	$5 \times 3\frac{3}{4}$	$3\frac{3}{4} \times 2\frac{1}{2}$
$13\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 3\frac{3}{8}$	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 2\frac{5}{8}$	$5\frac{2}{3} \times 3\frac{3}{8}$	$4\frac{1}{4} \times 3\frac{3}{8}$	$3\frac{3}{8} \times 2\frac{1}{8}$

## PAPERS.

$22 \times 7\frac{1}{2}$	$15 \times 11$	$15 \times 5\frac{1}{2}$	$11 \times 7\frac{1}{2}$	$11 \times 5$	$10 \times 5\frac{1}{2}$	$7\frac{1}{2} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{3}{4}$
$19\frac{1}{4} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 9\frac{5}{8}$	$13\frac{1}{2} \times 4\frac{1}{8}$	$9\frac{5}{8} \times 6\frac{3}{4}$	$9\frac{5}{8} \times 4\frac{1}{2}$	$9 \times 4\frac{1}{8}$	$6\frac{3}{8} \times 4\frac{1}{8}$	$4\frac{1}{8} \times 3\frac{3}{8}$
$19\frac{1}{2} \times 6\frac{1}{10}$	$12\frac{1}{8} \times 9\frac{3}{4}$	$12\frac{1}{8} \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6\frac{1}{10}$	$9\frac{3}{4} \times 4\frac{1}{2}$	$8\frac{1}{10} \times 4\frac{7}{8}$	$6\frac{1}{10} \times 4\frac{7}{8}$	$4\frac{7}{10} \times 3\frac{3}{10}$
$19\frac{1}{2} \times 6$	$12 \times 9\frac{3}{4}$	$12 \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6$	$9\frac{3}{4} \times 4$	$8 \times 4\frac{7}{8}$	$6 \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3$
$17\frac{1}{4} \times 5\frac{1}{2}$	$11 \times 8\frac{5}{8}$	$11 \times 4\frac{5}{16}$	$8\frac{5}{8} \times 5\frac{1}{2}$	$8\frac{5}{8} \times 3\frac{3}{8}$	$7\frac{1}{8} \times 4\frac{5}{16}$	$5\frac{1}{2} \times 4\frac{5}{16}$	$4\frac{5}{16} \times 2\frac{3}{4}$
$17\frac{3}{4} \times 5\frac{5}{8}$	$11\frac{1}{4} \times 8\frac{7}{8}$	$11\frac{1}{4} \times 4\frac{7}{16}$	$8\frac{7}{8} \times 5\frac{5}{8}$	$8\frac{7}{8} \times 3\frac{3}{4}$	$7\frac{1}{2} \times 4\frac{7}{16}$	$5\frac{5}{8} \times 4\frac{7}{16}$	$4\frac{7}{16} \times 2\frac{1}{16}$
$15\frac{3}{4} \times 5$	$10 \times 7\frac{7}{8}$	$10 \times 3\frac{1}{16}$	$7\frac{7}{8} \times 5$	$7\frac{7}{8} \times 3\frac{1}{8}$	$6\frac{3}{8} \times 3\frac{1}{16}$	$5 \times 3\frac{1}{16}$	$3\frac{1}{16} \times 2\frac{1}{2}$
$15\frac{1}{2} \times 5\frac{1}{10}$	$10\frac{1}{8} \times 7\frac{3}{4}$	$10\frac{1}{8} \times 3\frac{7}{8}$	$7\frac{3}{4} \times 5\frac{1}{10}$	$7\frac{3}{4} \times 3\frac{3}{8}$	$6\frac{1}{4} \times 3\frac{7}{8}$	$5\frac{1}{10} \times 3\frac{7}{8}$	$3\frac{7}{8} \times 2\frac{1}{10}$
$17 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 4\frac{1}{4}$	$8\frac{1}{2} \times 6\frac{3}{4}$	$8\frac{1}{2} \times 4\frac{1}{2}$	$9 \times 4\frac{1}{4}$	$6\frac{3}{4} \times 4\frac{1}{4}$	$4\frac{1}{4} \times 3\frac{3}{8}$
$13\frac{1}{2} \times 4\frac{1}{4}$	$8\frac{1}{2} \times 6\frac{1}{4}$	$8\frac{1}{2} \times 3\frac{3}{8}$	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 2\frac{5}{8}$	$5\frac{2}{3} \times 3\frac{3}{8}$	$4\frac{1}{4} \times 3\frac{3}{8}$	$3\frac{3}{8} \times 2\frac{1}{8}$
$13\frac{1}{4} \times 4\frac{1}{8}$	$8\frac{1}{4} \times 6\frac{5}{8}$	$8\frac{1}{4} \times 3\frac{5}{16}$	$6\frac{5}{8} \times 4\frac{1}{8}$	$6\frac{5}{8} \times 2\frac{3}{4}$	$5\frac{1}{2} \times 3\frac{5}{16}$	$4\frac{1}{8} \times 3\frac{5}{16}$	$3\frac{5}{16} \times 2\frac{1}{16}$



VIII.—Table for Calculating the Areas of Negatives and Prints in Square Inches.

SIZE IN INCHES.															
Nos. of negatives.															
	32 × 24	30 × 24	24 × 17	22 × 20	22 × 18	22 × 16	20 × 18	20 × 15	18 × 16	17 × 14	16 × 13	15 × 12	12 × 10	10 × 8	9 × 7
1	768	720	408	440	396	352	360	300	288	238	208	180	120	80	63
2	1,536	1,440	816	880	792	704	720	600	576	476	416	360	240	160	126
3	2,304	2,160	1,224	1,320	1,188	1,056	1,080	900	864	714	624	540	360	240	189
4	3,072	2,880	1,632	1,760	1,584	1,408	1,440	1,200	1,152	952	832	720	480	320	252
5	3,840	3,600	2,040	2,200	1,980	1,760	1,800	1,500	1,440	1,190	1,040	900	600	400	315
6	4,608	4,320	2,448	2,640	2,376	2,112	2,160	1,800	1,728	1,428	1,248	1,080	720	480	378
7	5,376	5,040	2,856	3,080	2,772	2,464	2,520	2,100	2,016	1,666	1,456	1,260	840	560	441
8	6,144	5,760	3,264	3,520	3,168	2,816	2,880	2,400	2,304	1,904	1,664	1,440	960	640	504
9	6,912	6,480	3,672	3,960	3,564	3,168	3,240	2,700	2,592	2,142	1,872	1,620	1,080	720	567
10	7,680	7,200	4,080	4,400	3,960	3,520	3,600	3,000	2,880	2,380	2,080	1,800	1,200	800	630



**IX.—Representative Fractions corresponding to the Scales of Maps published by the Survey of India Department.**

Scale.	Representative Fraction.	Scale.	Representative Fraction.
1 Inch = 256 Miles .	$\frac{1}{16,220,160.}$	1 Inch = 2 Miles	$\frac{1}{126,720.}$
1 Inch = 128 Miles .	$\frac{1}{8,110,080.}$	1 Inch = 1 Mile	$\frac{1}{63,360.}$
1 Inch = 96 Miles .	$\frac{1}{6,082,560.}$	2 Inches = 1 Mile	$\frac{1}{31,680.}$
1 Inch = 80 Miles .	$\frac{1}{5,068,800.}$	3 Inches = 1 Mile	$\frac{1}{21,120.}$
1 Inch = 64 Miles .	$\frac{1}{4,055,040.}$	4 Inches = 1 Mile	$\frac{1}{15,840.}$
1 Inch = 50 Miles .	$\frac{1}{3,168,000.}$	5 Inches = 1 Mile	$\frac{1}{12,672.}$
1 Inch = 48 Miles .	$\frac{1}{3,041,280.}$	6 Inches = 1 Mile	$\frac{1}{10,560.}$
1 Inch = 32 Miles .	$\frac{1}{2,027,520.}$	8 Inches = 1 Mile	$\frac{1}{7,920.}$
1 Inch = 24 Miles .	$\frac{1}{1,520,640.}$	10 Inches = 1 Mile	$\frac{1}{6,336.}$
1 Inch = 16 Miles .	$\frac{1}{1,013,760.}$	12 Inches = 1 Mile	$\frac{1}{5,280.}$
1 Inch = 12 Miles .	$\frac{1}{760,320.}$	16 Inches = 1 Mile	$\frac{1}{3,960.}$
1 Inch = 8 Miles .	$\frac{1}{506,880.}$	20 Inches = 1 Mile	$\frac{1}{3,168.}$
1 Inch = 6 Miles .	$\frac{1}{380,160.}$	24 Inches = 1 Mile	$\frac{1}{2,640.}$
1 Inch = 4 Miles .	$\frac{1}{253,440.}$	30 Inches = 1 Mile	$\frac{1}{2,112.}$
Atlas of India . .	$\frac{1}{255,561.}$	32 Inches = 1 Mile	$\frac{1}{1,980.}$



IX.—Representative Fractions corresponding to the Scales of  
 Measures furnished by the Survey of India Department.

Scale	Representative Fraction	Scale	Representative Fraction
1 inch = 1 mile	$\frac{1}{63,360}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 2 miles	$\frac{1}{126,720}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 3 miles	$\frac{1}{190,080}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 4 miles	$\frac{1}{253,440}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 5 miles	$\frac{1}{316,800}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 6 miles	$\frac{1}{380,160}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 7 miles	$\frac{1}{443,520}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 8 miles	$\frac{1}{506,880}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 9 miles	$\frac{1}{570,240}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 10 miles	$\frac{1}{633,600}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 11 miles	$\frac{1}{696,960}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 12 miles	$\frac{1}{760,320}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 13 miles	$\frac{1}{823,680}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 14 miles	$\frac{1}{887,040}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 15 miles	$\frac{1}{950,400}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 16 miles	$\frac{1}{1,013,760}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 17 miles	$\frac{1}{1,077,120}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 18 miles	$\frac{1}{1,140,480}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 19 miles	$\frac{1}{1,203,840}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 20 miles	$\frac{1}{1,267,200}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 21 miles	$\frac{1}{1,330,560}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 22 miles	$\frac{1}{1,393,920}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 23 miles	$\frac{1}{1,457,280}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 24 miles	$\frac{1}{1,520,640}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 25 miles	$\frac{1}{1,584,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 26 miles	$\frac{1}{1,647,360}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 27 miles	$\frac{1}{1,710,720}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 28 miles	$\frac{1}{1,774,080}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 29 miles	$\frac{1}{1,837,440}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 30 miles	$\frac{1}{1,900,800}$	1 inch = 1 mile	$\frac{1}{63,360}$